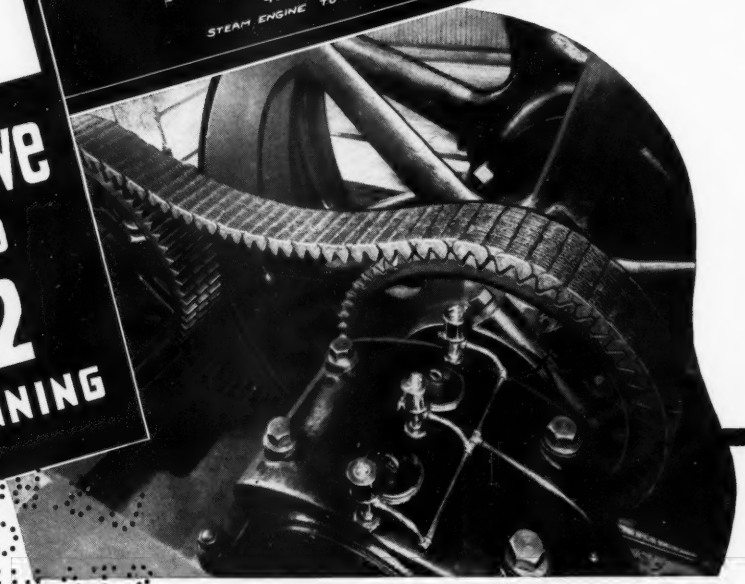
The CORNELL ENGINEER

National Bureau of Standards
MAY 1 1942
53213

Maybe WE MAKE OUR CHAINS TOO WELL

MorseDrive INSTALLED 1912 STILL RUNNING



THE service record of this Morse Drive goes back 26 years! And it's still giving satisfactory performance!

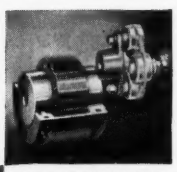
During most of those years this 400 h.p. drive from steam engine to line shaft has given continuous 24-hour service. A recent inspection showed chain and sprockets fit for many more years of efficient operation.

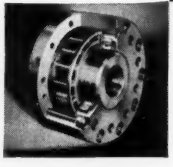
The Morse Silent Chain drive illustrated is a good example of the long, efficient, trouble-free life that is built into every Morse drive. Because of such exclusive Morse features as the rocker joint, which makes operation easy and cuts wear, Morse Silent chain drives deliver power with efficiencies up to 99.4%. Adaptable in all sorts of conditions and requirements; capacities, fractional horsepower to five-figure ratings.

Morse *better* drives are economical, dependable, efficient—yet they cost no more than ordinary types of drive! Let the Morse man in your territory tell you how Morse positive drives can fit into your power transmission problems.

Other MORSE PRODUCTS

FLEXIBLE COUPLINGS
Morse Standard Coupling, two facing hardened steel sprockets wrapped in a length of special chain. Morse Morflex utilizes live rubber for the flexing medium.





MORSE CLUTCHES
"Kelpo" and High Torque Clutches are adapted to free wheeling applications of all sorts. They free wheel without appreciable drag—drive smoothly and dependably.

SILENT CHAINS ROLLER CHAINS FLEXIBLE COUPLINGS KELPO CLUTCHES

MORSE *positive* DRIVES

MORSE CHAIN COMPANY ITHACA N. Y. DIVISION BORG-WARNER CORP.

Attention Freshman Engineers !

The "Cornell Special Drawing Set" has been designed to meet the requirements of the Engineering College. It is approved and guaranteed. Drop in—we'll be glad to show it to you.

We handle Dietzgen and K. and E. instruments.
We also have many used drawing sets on hand.

8%
Dividend on all your purchases

K. & E.
Slide Rules
Log Log
Vector
Polyphase

Save Money
by buying our
Used Textbooks

Books and Supplies for All Your Courses Are On Hand

The Triangle Book Shop

EVAN J. MORRIS, *Prop.*
412 College Ave. — Sheldon Court
Branch of Triangle Book at 413 College Avenue—(Formerly College Book Shop)
OPEN EVENINGS FOR YOUR CONVENIENCE

WELCOME,
CORNELL STUDENTS AND FACULTY

•

IT'S JUST A STEP FROM THE CAMPUS TO THE

NEW LINDEN GARAGE

227-231 LINDEN AVE.
PHONE 2054
M. H. RIPLEY, *Prop.*

Heated Storage and 24-Hour Guaranteed Repair Service

To Avail Yourself of Our
SPECIAL RATE
For Car Storage, See Us At Once

Ithaca Liquor & Wine Co., Inc.

134 WEST STATE STREET

Where The Best Costs Less

Open Daily: 8 A. M. to 11:00 P. M.
Sat.: 8:00 A. M. to 11 P. M. Dial 2625

FROSH!

VITAL INFORMATION

Delicious Sodas
Prescriptions Filled
All Drugs
Cameras
Films
Stationery

All These and More Obtainable at the

HILL DRUG STORE

328 COLLEGE AVENUE

DRAWING INSTRUMENTS
APPROVED
FOR ENGINEERING COURSES

KEUFFEL & ESSER'S
PARAGON — KEY — ANVIL

POST'S CORNELL

ELLIOTT
NO. 1070 — NO. 1225

ALTENEDER

Prices Start at $12.50 and
All of These Sets Are
Stocked By

THE CORNELL CO-OP

BARNES HALL — OPPOSITE WILLARD STRAIGHT

NOTICE

- **If you need tires—we handle the Atlas.**
- **It carrys a guarantee that is good from coast to coast.**
- **Stop in and let us give you a price.**
- **Yes we will take your old tires in trade.**

▼ ▼ ▼

R. T. G.
Esso Service Station

335 E. STATE ST. PHONE 2872

Start the School Year With
The Right Supplies From

Rothschild's

STATE AND TIOGA STS. DIAL 2711

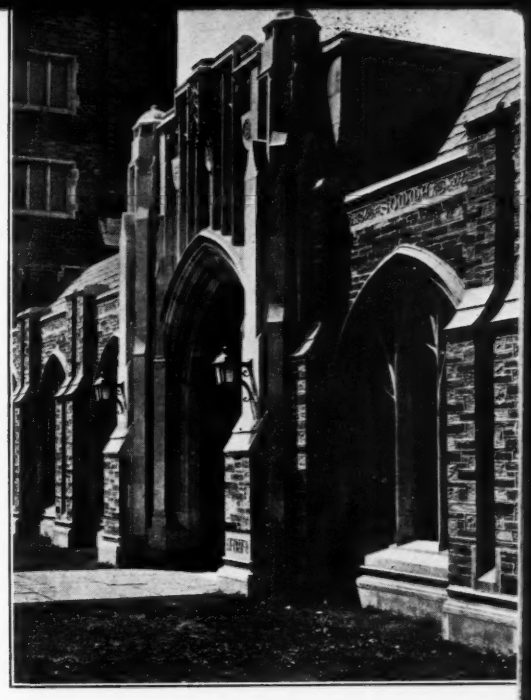
Indirect Student Lamps..**$1.98—$6.95**
Student Alarm Clocks..**95c** to **$1.25**
Laundry Cases **$1.00**
Cornell Engraved Stationery
72 sheets **79c**
Zipper Brief Cases .... **$1.19—$4.98**
Waste Baskets .....**25c** up
Smokers **$1.19**

Shop daily from 9 to 6; Sats. to 9 p. m.

The CORNELL ENGINEER

For **OCTOBER** 1939

VOLUME 5 NUMBER 1



CONTENTS

PROFESSOR R. H. THURSTON ..... Frontis

THURSTON CENTENNIAL 5
R. F. Howes

TO THE CLASS OF '43 6
Dean S. C. Hollister

MEN YOU SHOULD KNOW 7

FUNDAMENTALS OF HUMAN ENGINEERING 8
Alan H. Mogensen

MANAGEMENT LOOKS TO THE FUTURE 12
Professor J. R. Bangs

CORNELLIANS IN INDUSTRY ..... Center Spread

EDITORIAL 18

COLLEGE NEWS 19

CORNELL SOCIETY OF ENGINEERS 22

ALUMNI NEWS 24

OUR AUTHORS

Alan H. Morgensen, one of the nation's authorities on the human and scientific aspects of modern management, writes an interesting article on human reactions to the changes and situations encountered by the young engineer.

Professor John R. Bangs discusses the problems of the future as seen from the position of the executive. Eminently successful in the personnel field, "Johnny" is well qualified to write on this subject.

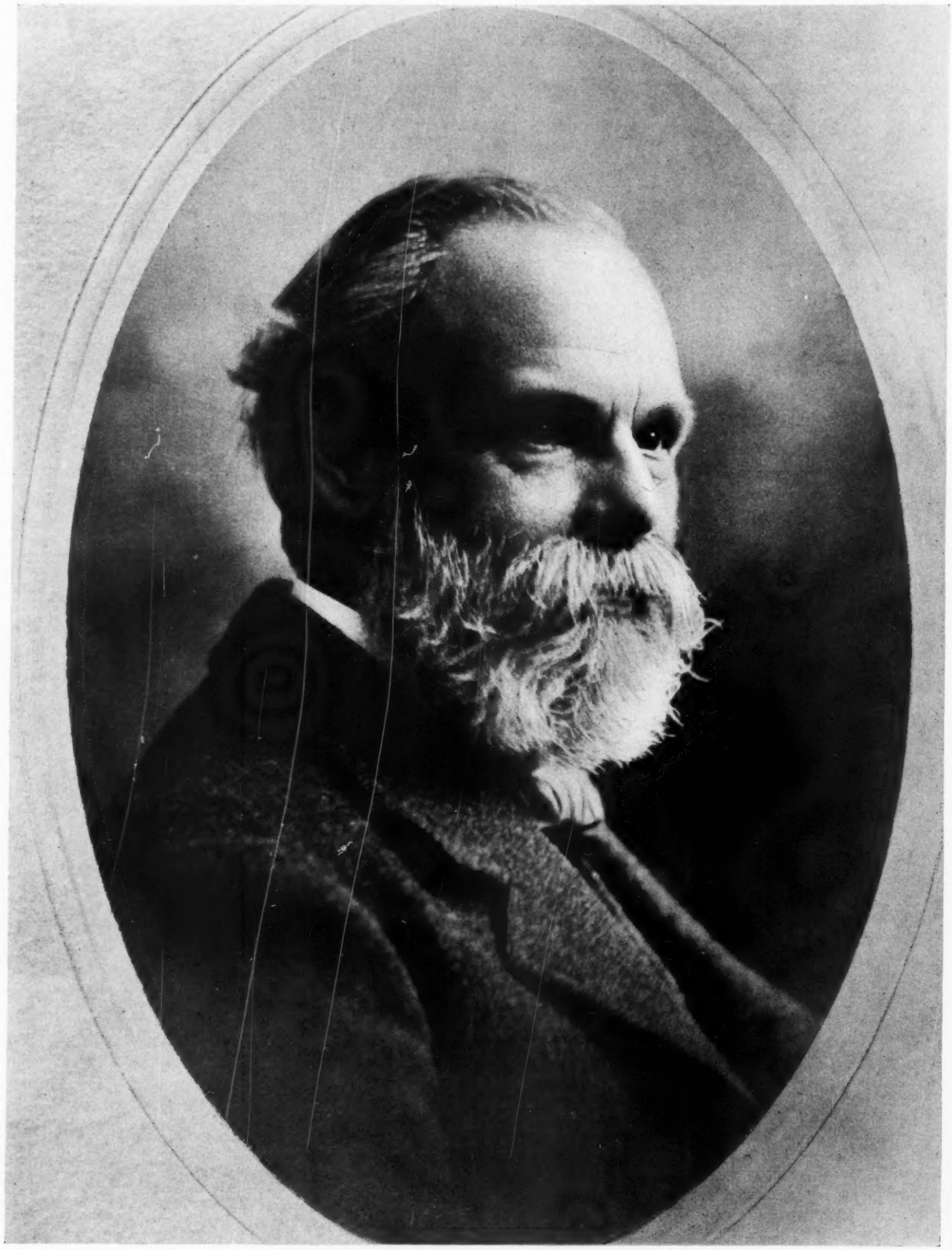
OUR COVER

Two Frosh being "high pressured" by a Cornell Engineer board member in front of the Straight.

MEMBERS OF THE ENGINEERING COLLEGE MAGAZINE ASSOCIATED
Chairman: Tom Rogers
135 W. 42nd St., New York City

Arkansas Engineer
Colorado Engineer
Cornell Engineer
Illinois Technograph
Iowa Engineer
Iowa Transit
Kansas Engineer
Kansas State Engineer
Marquette Engineer
Michigan Technic
Minnesota Techno-Log
Nebraska Blue Print
New York Univ. Quadrangle
North Dakota State Engineer
Ohio State Engineer
Oregon State Technical Record
Pennsylvania Triangle
Purdue Engineer
Rose Technic
Tech Engineering News
Wayne University Engineer
Villanova Engineer
Washington State Engineer
Wisconsin Engineer

Published monthly—October to May—by undergraduates of the College of Engineering, Cornell University. Entered as second class matter at the Post Office at Ithaca, N. Y., under section 103, Act of October 3, 1917.
Subscription per year: regular $1.50; with membership in the Cornell Society of Engineers $2.00, see President's age. Student $1.00; signle copy $.20.



PROFESSOR ROBERT HENRY THURSTON

CONVOCATION TO MARK CENTENNIAL OF R. H. THURSTON'S BIRTH

ALL alumni of the College of Engineering have been invited by the President and Trustees of the University to take part in a special ceremony on October 25 commemorating the 100th anniversary of the birth of Robert Henry Thurston, first director of mechanical engineering at Cornell. Dr. Thurston, who was brought to the University in 1885 by President Andrew D. White, served for 18 years, establishing comprehensive mechanical laboratories, writing textbooks, surrounding himself with able teachers, and setting educational standards that even today are not surpassed. Generally acknowledged as the greatest mechanical engineer of his time and as the great pioneer in engineering education, he gave to the College, according to his biographer, "prestige and standing in the very front rank of the engineering schools of the country and of the world."

Cornell alumni, of whom nearly 3,000 studied Engineering in Thurston's time, will join with graduates of Stevens Institute, official representatives of more than a hundred other technical schools and academic societies, Cornell Trustees, members of the Faculty, and students of the College in a one-day program of events designed not merely to emphasize Dr. Thurston's achievements but also to discuss ways in which engineering education may meet the critical challenge of the future.

Distinguished speakers at the Convocation in Bailey Hall Wednesday morning will include Dr. William F. Durand, emeritus professor of mechanical engineering at Leland Stanford University, who was a colleague of Dr. Thurston at Cornell from 1891-1903 and later wrote his biography; Dr. James Pickwell Adams, vice president of Brown University, where Dr. Thurston was an undergraduate; Admiral Wilson Brown, superintendent of the U. S. Naval Academy, where Thurston began his teaching career; Dr. Harvey N. Davis, president of the Stevens Institute of Technology, where Thurston established the first laboratory for instruction in mechanical engineering; and Dean S. C. Hollister of the College of Engineering. President Edmund E. Day will preside.

This convocation, scheduled for 10 a.m., will be preceded by an academic procession of Trustees, Faculty, delegates, and distinguished guests. In the afternoon there will be conducted tours of the Engineering buildings. Laboratory apparatus designed by Dr. Thurston, some of which is still in use, will be on exhibit, as will a set of Dr. Thurston's numerous technical publications.

The entire affair has the active cooperation of the American Society of Mechanical Engineers, of which Thurston was the first president. Both Dr. Davis and Dr. Durand are past-presidents of the society and will serve as official delegates, as will President A. G. Christie '05, professor of engineering at Johns Hopkins University; Past President Dexter S. Kimball, dean emeritus of the College of Engineering at Cornell; and Vice President James W. Parker '08 of Detroit. Mr. Parker has served as the society's representative on the committee on arrangements, of which Dean Hollister is chairman.

As a special feature of the occasion, the Cornell University Press is publishing a Centennial Edition of Thurston's "History of the Growth of the Steam Engine," a work that is still a classic in its field. The new edition will have a concluding chapter, bringing the subject up to date, by Director W. N. Barnard '97 of the Sibley School of Mechanical Engineering.

Special guests at the celebration, besides the Thurston family, the descendants of Hiram Sibley and Hiram W. Sibley, who laid the foundation for the endowment and present buildings of the College, Mrs. Florence Rand Lang, and other benefactors of the College, will be the members of the Cornell classes from '86 to '06, all of whom have been sent personal invitations by the University. Many replies, already received, indicate the great esteem in which Dr. Thurston was held by those whom he taught or who in other ways had the privilege of knowing him. Training engineers to meet the problems of the future was a subject of perennial

To the Class of '43

I am pleased to extend to you a warm welcome on behalf of the College of Engineering.

As you begin your studies in engineering you really enter your professional life. The record you make here will be as important to you in the future as the record you make in any other similar period. A good record is an asset of permanent value.

As you begin your studies you assume new responsibilities. Cornell engineers who have studied before you have built a tradition of performances of high quality in the engineering profession. You are now passed a share of that tradition. It is a sacred trust which you must always safeguard.

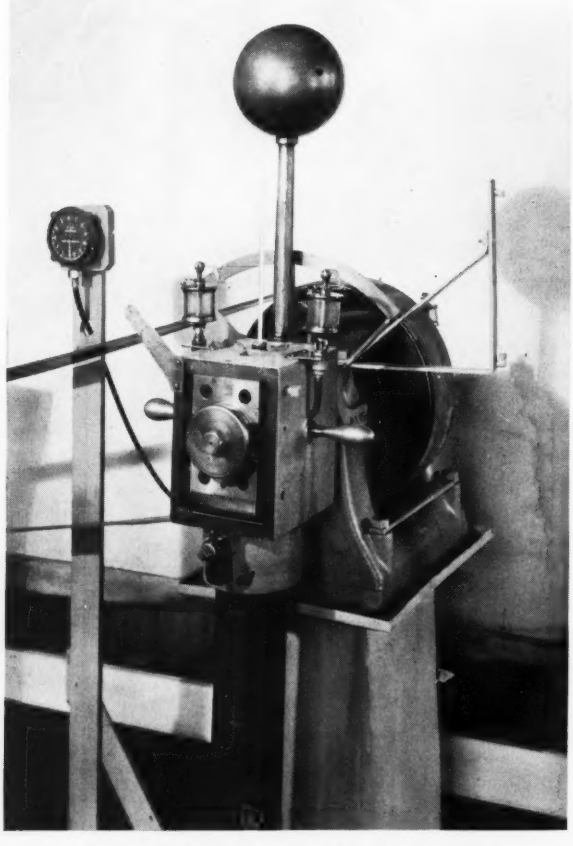
Whatever you do in school, or after, you do henceforward as a Cornellian. We have great confidence that you will at all times not only safeguard the good reputation of your University, but that you will accept the challenge to build it to new heights.

You may be assured that the entire staff of the College wish you well, and will give you every assistance they can to aid you in the progress of your work. Remember always that ultimate success is, after all, an accumulation of daily successes.

Sincerely yours,
S. C. HOLLISTER

September 18, 1939.

interest to him, and as a pioneer he proclaimed values and enunciated principles that have an important bearing on engineering education of today and tomorrow.



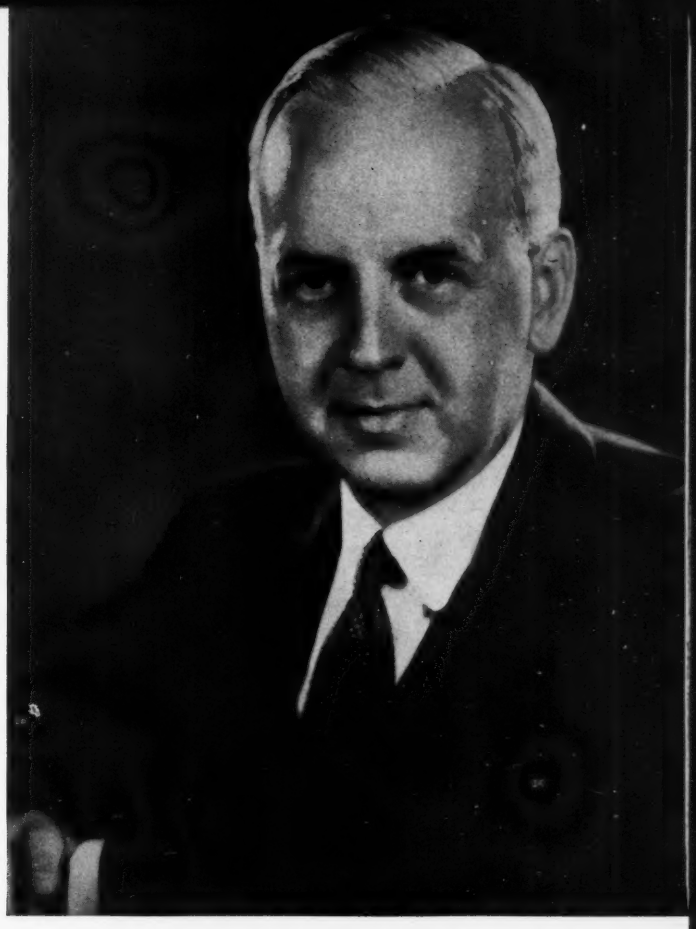
Oil Testing Machine Designed by Dr. Thurston

Brought up in his father's shop, where steam engines were built, Robert Thurston carried his interest in mechanics into college, taking engineering at Brown University. He was in the U. S. Navy during the Civil War, and was later assigned to Annapolis as an instructor. There he began to develop a plan for training engineers that would supplant the current vocational courses in mechanic arts. He put his plan into operation at Stevens Institute between 1871 and 1885, founding the first mechanical laboratory for purposes of instruction, assembling and when necessary inventing apparatus, and writing a pioneer manual, "The Materials of Engineering," for his students.

Between 1885 and his death in 1903, Dr. Thurston devoted himself to building a strong Engineering College at Cornell, and succeeded so well that at the turn of the century the training available here had no peer in this country. Not only did many of the students of those years become distinguished leaders of American industry and of the engineering profession, but more than 60 of them later became deans or directors of engineering at other institutions, so that the Cornell idea was spread to all parts of the United States.

Throughout his career as a teacher and administrator, Dr. Thurston continued the practice of engineering and wrote voluminously for technical publications. Besides serving two terms as president of the A.S.M.E., he was three times a vice president of the American Association for the Advancement of Science and a member of the American Society of Civil Engineers and many other technical and academic organizations in this country and abroad. Delegates from many of these societies will be present in Ithaca on October 25.

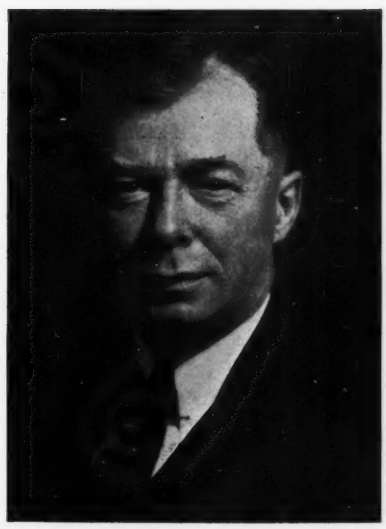
DEAN HOLLISTER



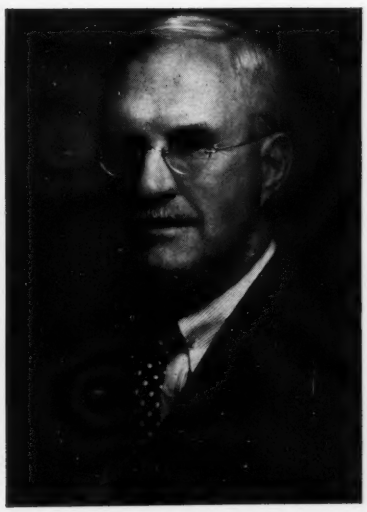
PRESIDENT DAY

Men You Should Know

DIRECTOR BARNARD, M.E.



DIRECTOR RHODES, Ch.E.



DIRECTOR MALCOLM, C.E.

DIRECTOR LEWIS, E.E.

FUNDAMENTALS OF HUMAN ENGINEERING

By **ALAN H. MOGENSEN**

ON A RECENT visit to Ithaca, Johnny Bangs asked me to talk to some of his classes. The editor-in-chief of the CORNELL ENGINEER, like everyone else that Monday morning, was coming out of a dense fog occasioned by a glorious week-end, and seemed to think that I should put some of my comments down in black and white.

In a weak moment I agreed to do so, but instead of merely repeating what I gave to the sophomores and seniors, I first attempted to define my audience. I deceided it would be either the alumni, the seniors or the undergraduates. You will notice I omit the faculty. I have not been out of school long enough to think that I can tell the professors anything.

First, I eliminate the alumni. I do this because I have more work than I can possibly handle, and I am not attempting to sell anything to the Cornell graduates who have become successful executives.

I next eliminate the undergraduates, because in looking back to my days at Cornell I am absolutely sure that any advice given us by so-called successful alumni was given almost no attention whatever. In fact, the only talk given by these shining lights that I remember during my four years was one by Willis Carrier who told us that we should be sure to ask for enough money when we graduated and applied for a job. While I have never had to ask him for a job with the Carrier Corporation, I have some doubt as to the close tie-in between his advice given to a group of wide-eyed seniors and his position as the hard-boiled employer of technical graduates. (Of course, that advice was given before we ever heard of the great depression.)

That brings me to the seniors, and certainly I do not want to put myself in the position of the old grad who is attempting to tell the class of 1940 what they should do to achieve success. (For years I read the American Magazine and noted with interest the rules of success laid down by our industrial leaders. I often wonder just what a tabulation of these leaders who promulgated the formulas against their present situation, now that the days of prosperity are gone, would show. It would be interesting to see just how many of the big shots are still in responsible positions.)

May I give one excuse for attempting to advise any of you. In my work, I have been conducting training programs in Work Simplification for many companies in all parts of the United States and Canada. As part of these programs, we either have to work through an existing industrial engineering organization or if none is available, we must build such a group. Naturally the men comprising such an organization are recent graduates of technical schools. In this way each year I am working with and instructing 40 or 50 men who have taken courses in industrial engineering, business administration, administrative engineering, or in one way or another have found themselves in

such a department.

The greatest weakness I find displayed by the majority of these men is their inability to get along with people. Don't think for a moment that I am selling Dale Carnegie's book. (I do, however, often recommend to these men that they secure a copy of that book and go home and study it carefully). I have come to the conclusion that success in this field is 90% the ability to get along with people and 10% technical knowledge of the field. Thomas A. Edison said some years ago: "Problems in human engineering will in the future receive the same attention that the last century gave to engineering in more material forms."

One of the leading organizers of the Steel Workers Organizing Committee of the C.I.O. said recently:

"In the National Office we deal solely with the top executives, as contractual relations in the plant are administered by the local union committeemen and plant foremen, superintendents, and general managers. My experiences with the top executives have brought out sharply one generality.

"Salesmen and purchasing agents make better "labor relations" or "personnel" executives than operating officials. A salesman has been reared in an atmosphere much different from that of an operating or a production man. The nature of the salesman's job requires him to be patient. He has experience in bargaining, giving and taking, and in judging the other fellow. He can patiently negotiate on a point, because he knows eventually some agreement will be made. He knows how to compromise. In contrast, the operating man has a completely different training. The major thing that has been inculcated in him is the importance of efficiency, and the only way he has been taught to get it is through giving orders. He has learned how to take orders and to give them. The nature of his work has been to "do what I am told." In turn, he has told others to "do as you are told, or else."

"It is much harder for him to change over to a democratic atmosphere than it is for a salesman. The operating man quickly gets impatient in conferences, easily flies off the handle, and is frequently irritated by having a union committeeman question one of his acts. The salesman, on the other hand, does not have as much to unlearn and, by and large, he makes the necessary adjustments easier and more effectively. I do not mean to imply that only salesmen or purchasing agents make good executives to handle labor relations for a company. I merely say my experiences have been that their temperament is closer to the temperament required of a man to bargain collectively with union officials than is that of an operating man."

Whenever I am endeavoring to introduce some new technique or procedure, and I do not find ready acceptance of my ideas, I attempt to control myself in this fashion:

"Don't lose your temper. Did you ever hear of a salesman who got mad at a customer because he would not buy from him?" I say to myself: "What is wrong with me? Why can't I sell this man on this idea?"

That is what has been wrong with industrial engineers ever since the time of Taylor. I say this because when I was teaching industrial engineering at the University of Rochester following my graduation from Cornell, I could not understand why it was that all the principles of scientific management as outlined in the writings of Taylor, Gantt, Gilbreth, and Kimball were either non-existent or appeared in spotty applications only as I toured the various industrial plants in the U. S. I found one plant where they had a fine system of production control. However, that would be the only evidence of scientific management. In another plant they had very fine industrial relations, but were doing nothing at all in the field of time study or motion study. And so it went. I visited the plants where scientific management had originally been developed. Often I heard the statement "Yes, we had all that, but we threw it out." The more I got around the more I found that the answer lay entirely in the lack of understanding of some of the simple fundamentals of human relations rather than any weakness in the principles themselves.

I found that most industrial engineers ignore two simple fundamentals of human engineering.

In the first place, we resist new ideas. Someone once said that the mind is like a parachute—it functions only when it is open. If I only could know the exact state of everybody's mind, whether it is open or closed, we could really make progress. We would not waste time on points to which you already agree, and we could adequately cover the ones that you may question.

Just check your own reactions to some of the new things. What was your reaction to the first streamlined car? Didn't you say: "It's crazy, ridiculous! I'll never ride in one of those things!" Nearly everyone who first saw those new lines had a closed mind. And yet today 91% of us favor streamlining.

The same thing happened with the new Diesel-electric streamlined trains. I had a ride in one in 1931, was tremendously enthusiastic. But those to whom I raved said it was crazy, ridiculous, just a fad. However, streamlined trains are not new. First invented by Samuel Calthorpe in 1865, the idea was next considered by the Union Pacific in 1905, but because of the closed minds in the railroad field, it was 1935 before we heard much about them. Today we know what they have done for the railroads, in helping them win back lost business.

The best illustration is one that you have heard.

You may remember that the most serious problem facing the automobile industry in the early days was painting the cars. Before we had nitrocelluluose lacquers, it took about 30 days to paint a car. So Kettering called a conference of paint experts and said, "We must reduce the drying time of paint." Well, the experts talked and talked, and about all they could agree on was that nature governed the drying time of paint. I suppose Kettering showed his impatience, because someone said, "Well, Mr. Kettering how long do you think it should take?" "Oh, about an hour," he replied. They took their hats and coats and went home saying, "The guy is nuts! I guess we told him where to get off!"

One day Kettering saw a lacquered wooden pin tray in the window of a shop on Fifth Avenue in New York. He went in and asked where the tray was made. They said, "Over in Newark, N. J.," so he took the address and went over to Newark. He found the fellow who had painted the tray, and said he would like to buy some of the paint. "How much of it do you want?" he was asked. "About a quart" was the answer. "I can't give you a quart. We never make up that much at a time. Anyway what would you do with a quart?" "I thought I'd paint an automobile door with it," said Kettering. "You can't do it." 'Why not?" 'It dries too damn fast!" Get that—"It dries too damn fast!"

There on one hand you had a group of experts who said that nature governed the drying time of paint and that you couldn't do anything about it, and here was a fellow who said, "It dries too damn fast."

But of course Duco did not come overnight. There were plenty of headaches. I had a closed mind along with many others.

At that time my car needed painting, but as it was really an expensive job in those days, I couldn't afford it. One of my friends in a plant where I was working at the time said, "Why don't you take your car up to our experimental department? They will paint it for nothing." "What's the catch", I said. "All you have to do is to bring the car in once a month and let them look at it. "Nothing doing," I said, "I've heard about that stuff. It peels off." Well, in spite of the skeptics we had Duco, and today we have even faster-drying lacquers.

Another story that shows how we resist new ideas is told in a Boston newspaper editorial of about 67 years ago. It said, "A man by the name of Joshua Coppersmith has been arrested for attempting to extort money from ignorant and supersititious people by exhibiting a device which he claims will transmit the human voice any distance over metallic wires. He calls the instrument a 'telephone' which name is obviously intended to imitate the word 'telegraph.' It is a well-known fact that the human voice cannot be transmitted over wires as with the dots and dashes of the Morse code, and even if it were possible to do so, of what practical use would it be?" And there are countless other similar examples.

Secondly, we resent criticism. Several years ago I wrote a 16-page article for *Factory* called, "How to Set Up a Program in Motion Economy," and I was quite proud of it. I sent copies to some of my good friends and said, "Please read this over and then criticize it, tear it to pieces. Don't tell me it is good, tell me what's wrong with it." Only two did anything about it. One, the vice-president of one of the DuPont divisions, stopped me some weeks later and said to me, "Here's that assignment you gave me." I said, "What assignment?" He said, "You remember the 16-page article you asked me to criticize. I took it home and went over it carefully and here are my criticisms." There were six pages of closely written notes clipped to it. My first reaction was, "Why you son-of-a-gun, there couldn't be that much wrong with it." I was ready to fight right away.

As he made the first comment I started pounding the table and arguing, trying to justify what I had written. Then I said to myself, "Wait a minute. I asked him to criticize this and maybe he's got something there." I took it home and went over it and every once in a while I'd say to myself, "That guy doesn't know what he's talking about." It took me months to get any real benefit out of his criticism. Now if we resist criticism when we deliberately ask for it, think how much more we resent it when it comes in on us entirely unexpectedly.

Recently the New Yorker ran a cartoon showing a man sitting on the edge of his cot in jail holding a paper in his hand, but he wasn't reading it. He was sitting there laughing. The title under the cartoon was, "I certainly told that judge where to get off!" There he was, not knowing how he was going to get out of jail, but still delighted over what he had said to the judge.

Don't most of us really get fun out of showing somebody else where he is wrong. Take, for instance, a foreman who comes dashing into the house and says, "Mary, what've you got for supper? I'm starved. Boy, did I have a swell day today!" His wife says, "What're you feeling so good about? D'ya get a raise?" And he says, "No, but one of those time study men came into my department. Let me tell you, did I make a monkey out of him. When he went out of there I fixed him so he'll never come back! I certainly showed him up."

That is just human nature. But what are we going to do about it. Surely we are not going to attempt to change people? We are not going to attempt to correct these things, but having a better understanding of them will enable us to accomplish things that per-

haps we have been unable to get done. People say to me, "You don't for a moment think that you can change some of our older foremen, do you?" Harry Myers, who was one of the finest men in the field of Industrial Relations, once answered this by saying, "That all depends on what you call old. Age is only a point of view. I know some old people who are young and some young people who are old. For if you think you know all about something, if you believe there can be no further improvements, you are old. Yes, old enough to die. In fact, you are dead and just waiting for your competitors to hold your funeral! However, if you are sure that everything can be done much better than it is now being done, or ever will be done, ah, then you are young and growing and prosperous years are ahead of you and all you control."

Dr. Elton Mayo of the Harvard School of Business Administration began a study of this in 1930 at the Western Electric plant in Chicago. When I first heard about this work I became quite interested in it. I think we should all become more familiar with this valuable study in the field of human relations. I quote from an article in "Management and the Worker:"

"Where does this threat of too rapid change originate? Looking first at the technical organization it can be seen that, just as resistance to change characterizes these informal employee groups, so capacity for constant and rapid change characterizes the technical organization. One of its chief characteristics is its logically contrived character, which allows for rapid change. The success of management depends in large part upon keeping abreast of the times. Management is constantly making mechanical improvements and instituting changes designed to reduce costs or improve the quality of the product. It is constantly seeking new ways and new combinations for increasing efficiency, whether in designing a new machine, instituting a new method of control, or logically organizing itself in a new way.

"It is to be expected that this striving for technical improvement would have consequences at the work level. The task of self-improvement is generally delegated to special organizations. Representatives of these organizations are either directly experimenting with the worker (e.g., cost reduction, the setting of piece rates, and the technical layout of the job) or indirectly doing research which utimately impinges upon him (e.g., redesigning a machine or product). Frequently their contacts with the employee are impersonal. They are interested in him only in so far as his actions are related to the problem with which they are concerned. For members of such organizations, research frequently becomes an end in itself. The result of such activity ultimately expresses itself at the work level in the form of incessant change."

Take, for example, an engineer in General Motors Research Corporation working on the problem of eliminating the old type of spring, held over from the horse and buggy days. Does he stop to think what will be the effect on Joe Jablonski over at the Buick plant in Flint if this new spring is finally evolved. Maybe Joe has been hanging those springs for the last ten years, and one day they come to him and say, "Joe, in the new models there will be no more springs of the kind you have been putting on in the last ten years. We'll give you a job as a welder."

You can imagine the effect of a change like that on a man who has put his heart and soul in his work, and who suddenly has to learn a brand new trade. The man who is interested in his research problem often doesn't realize the shock of this sudden elimination of his skill and experience.

"Granted that the technical organization makes for rapid change in the working environment, why are these changes opposed by the worker? There is no reason to suppose that all of them are detrimental to the worker's interests. In fact, many of them have as their express purpose quite the opposite intention. Many changes are instituted to improve his condition and to make it possible for him to earn more money. Why then are the workers seemingly organized to resist change? The answer to this question can best be found from an examination of the social significance of these changes to the worker."

"First, it is important to note that the worker occupies a unique position in the social organization. He is at the bottom level of a highly stratified organization. He is always in the position of having to accommodate himself to changes which he does not initiate. Although he participates least in the technical organization, he bears the brunt of most of its activities. Because of his position in the social organization, he cannot hold to the same degree the sentiments of those who are instituting the changes."

"Secondly, not only is he asked to accommodate himself to changes which he does not initiate, but also many of the changes deprive him of those very things which give meaning and significance. His established routines of work, his cultural traditions of craftsmanship, his personal inter-relations—all these are at the mercy of technical specialists. He is allowed neither to retain his former traditions and codes nor to evolve new ones of any duration. Not these social codes and customs which define his relation to his work and fellowmen are not capable of rapid change. They are developed slowly and over long periods of time. They are not the product of logic but are based on deeply rooted sentiments. Constant interference with such codes is bound to lead to feeling of frustration, to an

(*Continued on page* 26)

MANAGEMENT LOOKS TO THE FUTURE

PART I

By **PROFESSOR JOHN ROBERT BANGS ME, '21**

A CERTAIN business man, so the story goes, was relaxing in his office chair one afternoon back in the summer of 1929, when suddenly there flashed through his mind the idea that business could not possible get any better. Drawing obvious conclusions, he reached for the telephone and directed his broker to sell all of his stocks.

Even if the story is mythical, its moral is very real. Management, whether concerned with the directing of our personal affairs, the operation of our factories or stores, or the government of our nation, must prepare for tomorrow.

And how is today's management preparing for the future? By constructive planning and the formulation of policies that tend to visualize the interests of society as a whole—the interest of stockholder, the job holder, the customer, and the public. Supporting this point of view, the coordinating committee of the Seventh International Congress has published a small brochure entitled, "Today's Management Looks Ahead". Contained therein is the following:

The Creed of Management

"We who are responsible for the management of business in supplying the needs of the public for goods and services and who recognize our obligation to stockholders and employees, believe:

"That we should constantly seek to provide better values at lower costs so that more of our people can enjoy more of the world's goods.

"That we should strive to develop the efficiency of industry so as to earn a fair return for the investing public and provide the highest possible reward for the productivity of labor.

"That we should stimulate the genius of science and utilize the methods of research to improve old products and create new ones so as to consistently provide new fields of employment for the present and coming generations.

"That management should encourage fair trade practices in business which, whether affected by competition or cooperation, will be so shaped as to be for the best interest of our customers and of society as a whole.

"That it is management's duty to be alert to its own shortcomings, to the need for improvement, and to new requirements of society, while always recognizing the responsibility of its trusteeship.

"That business in this country has never been what it could be and never what it yet will be.

"That Business, Labor, Government, and Agriculture working hand in hand can provide jobs and the opportunity for all to work for security without loss of our liberty and rights as free men."

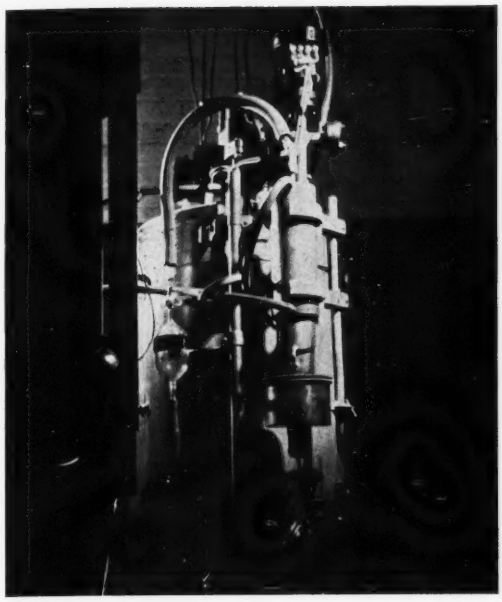
Perhaps these farsighted statements may stand as land marks for future management. In any event, formulated as they were by the representatives of top management, they definitely forecast the trends for management in the world of tomorrow.

To present these tendencies in greater detail, I have summarized the findings revealed when American business meets to discuss its problems. Many of these facts and opinions are given from the point of view of a participant, or as a spectator at management society meetings while others have been revealed by a rather extensive study of the literature. Analyzed, classified, and condensed, they will be developed in this paper under four principal headings:

1. Production
2. Distribution
3. Personnel
4. General Administration

Trends In Production

The trends in all fields may well be introduced by the words of President Davis of General Mills: "Management isn't a man or a group of men, but an idea. It is the idea of co-ordinating the work done by a lot of people so that they can all be better off."



Research, The Source of New Ideas and Products

Research

Research, the source of new ideas and products, is growing at an increasing rate. American industry, as a whole, is spending approximately $200,000,000 yearly on research and maintaining some 35,000 trained scientists in approximately 1,600 laboratories. Eighteen of the new industries which have grown directly out of scientific research within our lifetime, today provide one-four of all of the employment in the United States.

There is marked evidence that research, sometimes called "the last stronghold of industrial secrecy", is yielding to the principle that progress for an industry as a whole means progress for individual companies. The trend definitely points to the thinking that progress through the disclosure of new knowledge is the only sure road toward greater success.

The Regularization of Employment

More widespread attempts are being made to neutralize, as it were, the ill effects of economic fluctuations and irregularities. This is being done by training operators to become more versatile so that they may be transferred from job to job, by the establishments of flexible budgets, the use of complementary products, the accumulation of stocks during the slack season in anticipation of a coming sales peak, etc. Proctor & Gamble, Eastman Kodak, Nunn-Bush Shoe, Hormel and Other organizations have made satisfactory progress in this direction.

Foreman Training—Employee Recognition

There is a growing awareness that the foreman as the representative of management must receive careful training. This recognition has resulted in training courses and programs for foreman to be organized on the country-wide basis with national headquarters in New York.

Mr. Myron H. Clark has estimated that the 40,000,000 men and women who work in business in this country may be classified into three groups:

4% are proprietors and salaried officers;

12% are pivotal people—department heads, buyers, foreman, etc.;

84% are the rank and file of men and women workers.

Further investigation shows that it is upon this supervisory group—the 12% of pivotal people—that both management and the worker depend for the proper exchange of confidence, the proper adjustment of men and women to their jobs, as well as the direction of operating methods.

Of even greater significance is the changed attitude of management towards the individual worker. First, he was viewed as a commodity pure and simple. Later he became an artisan. Today we find as his activities become more and more concerned with the control of equipment, the control of quality and quantity, the responsibility for costs, and budget items that progressive management is increasingly viewing the worker as a manager in his own right.

Humanistic Tendencies

Reversing almost completely the old idea of adjusting the worker to operating conditions, a rather widespread trend seems to be evident for fitting the factory productive facilities to the needs of the individual. Literally thousands of devices are now being attached to machines and work places for making work easier and simpler. This movement, termed Work Simplification or Motion Economy, is releasing hands for easier symmetrical movements, putting feet to work, utilizing the rotative movement of the body in a circular work place, and using other means of adapting the workplace to the worker.

Purchasing

Organizations who have for years adhered to the most progressive of policies for the company as a whole have neglected in many instances the status of the purchasing department. The function of procurement is still too often associated with barter, sharp practices, unwise reciprocal agreements, etc. In some respects, purchasing departments reflect the attitude of the purchasing agent who, being seriously ill, called a specialist to his bed side.

"Yes," said the specialist, "I can cure you."

"What will it cost?" asked the sick man faintly.

"Five hundred dollars," said the specialist.

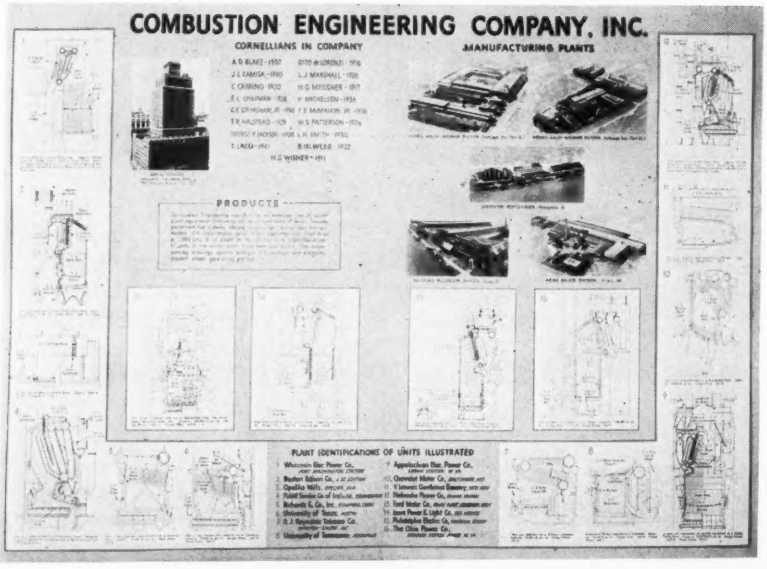
"You'll have to shade your price a little," replied the Purchase Agent, "I had a better bid from the Undertaker."

(*Continued on page* 16)

CORNELLIANS in

American Rolling Mill Co. (ARMCO)

Calvin Verity '11 ME
Earl A. Emerson '10 ME
Newman Ebersole '10 AB
Arthur R. Edwards '22 AB
Fred R. Dorner '27 AB
Wm. L. Cressman '28 A CE
Joseph S. Thomas '27 C ME
Horace A. Benedict '26 ME



Combustion Engineering Co., Inc.

Alfred D. Blake '07, ME
Joseph L. Camisa '30 E ME
Constantince N. Carina '20 M
Edward C. Chapman '28 ME
George E. Grimshaw, Jr. '38 ME
Thane R. Halstead '29 ME
George P. Jackson '08 ME
Tallmann Ladd '20 AM
Otto deLorenzi '16 A ME
Leonard J. Marshall '26 ME
Harold Meissner '17 ME
Henry H. Michelsen '36 ME
Thomas E. McMahon, Jr. '36 ME
Ward S. Patterson '26 ME
Lester H. Smith '30 M EE
Benjamin W. Webb '22 ME
Henry G. Wisner '11 ME

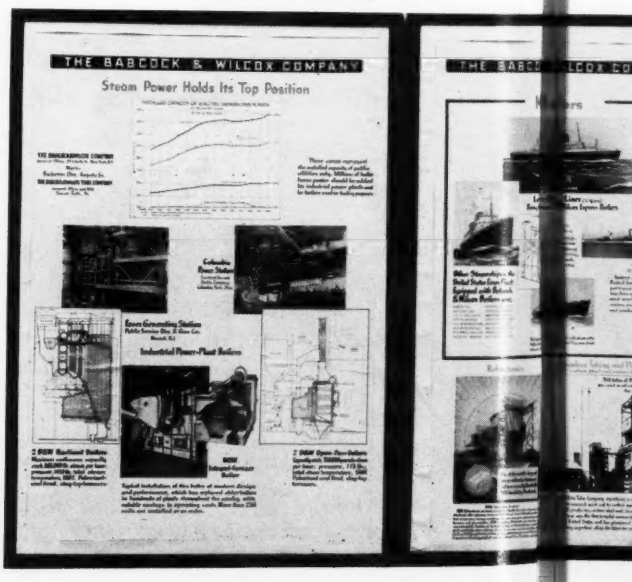
Babcock & Cox Co

George R. Ashton '35 ME
Jas. E. Brinckerhoff '17 ME
Paul M. Brister '36 ME
Dale Bumstead, Jr. '21 ME
Henry E. Chambers, Jr. '11 ME
John S. Craig '36 BS in AE
Cornelius C. Crusel '22 CE
Joseph C. Delibert '36 CE
William B. Gregory '23 ME
James F. Harvey '35 CE
Thomas B. Holt '19 CE
James D. McCullough '26 CE

PROJECT BY BETHLEHEM STEEL CORNELLIANS
THIS IS A PROJECT IN WHICH CORNELL GRADUATES HAVE PARTICIPATED — IN DESIGN, OPERATION OR MAINTENANCE
BETHLEHEM'S CONTINUOUS STRIP MILL AT LACKAWANNA, N.Y.
CORNELL GRADUATES IN LACKAWANNA PLANT

Bethlehem Steel Corporation

Edward F. Entwisle '06 ME
J. Harry Costello '06 E
Harold C. Harding '10 ME
Robert W. Graham '15 ME
Achilles E. Michel '23 MME
John H. Berean '27 M
William Pfaff '32, CE
Robert F. Fallan '33 CE



NSin INDUSTRY

On this page we present pictures of a few of the exhibits prepared by leading industrial firms for the Engineering Show of 1939.

Wright Aeronautical Corporation

Kenneth Browne '28 Grad. Asst.
George Du Bois '27 ME '29
Ed Sulzman '34 ME
Austin Mathey '37 BS
Herbert Stelljes '32 ME
Lewis Townsend '34 ME
Murray Crossette '38 ME
Will W. Sawdon '38 ME
James J. Wilder '39 ME

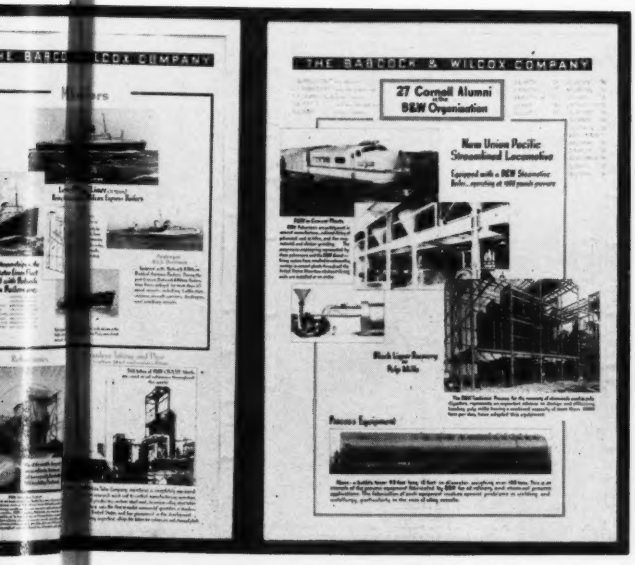
PROJECTS IN WHICH CORNELL GRADUATES ARE PARTICIPATING
AT THE
WRIGHT AERONAUTICAL CORPORATION
PATERSON, NEW JERSEY
CORNELLIANS AT THE WRIGHT COMPANY INCLUDE:

International Harvester Company

Andrew W. Seacord '09 ME
James D. Grant '09 ME
Edwin A. Hunger '11 ME
Benjamin F. Courtright '07 AB
Arthur P. Cottle '07 ME
James A. Bundy '11 ME
George H. Cottrell '32 ME
Alan H. Page '22 ME
Thomas A. Rice '16 A ME
M. B. Edgerton '93 (Retired)
Ross M. Babbitt '24 Grad. work
Wilkin H. Seacord '36 ME

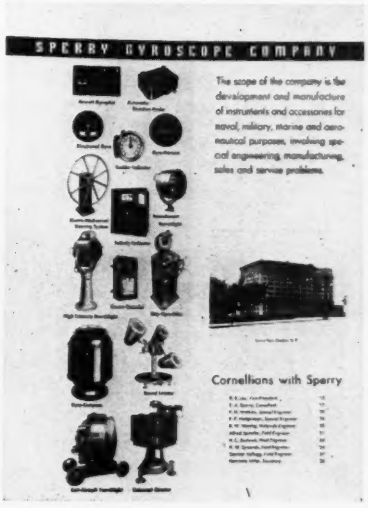
ock & cox Company

Cornelius W. Middleton '16 CE
Thomas H. Paterson '38 BS in AE
Will H. Rowand '29 M
Henry J. Runge '10 M
Elwood F. Searles '24 ME
Rolfe Shellenberger '22 ME
William H. Shipman '22 ME
Sidney M. Walzer '35 CE
William J. Weakland, Jr. '36 CE
Gerald S. White '37 ME
Wilho Wiitanen '36 ME



Sperry Gyroscope Company

Robert B. Lea '15 AM
Elmer A. Sperry '15 AM
Frederic M. Watkins '20 ME
Francis P. Hodgkinson '21 ME
Robert W. Waring '30 ME
Alfred G. Spindler '31 ME
Herbert C. Bostwick '35 BS
Horace W. Seymonds '34 EE
Spencer Kellogg, II '37 ME
Henrietta Miller '38 Arts


SPERRY GYROSCOPE COMPANY
The scope of the company is the development and manufacture of instruments and accessories for naval, military, marine and aeronautical purposes, involving special engineering, manufacturing, sales and service problems.
Cornellians with Sperry

Industrial Design—The Art of Making a Properly Designed Product of Pleasing Appearance.

(*Continued from page* 13)

This restricted point of view has often nullified the efforts of progressive policy makers in sales, personnel, and other departments. Fortunately, top management is beginning to realize the harm that has been done, and the tendency today seems to be in the direction of making the purchasing agent a member of the committee on General administration.

Scientific Methods

There is an increasing trend in production toward statistical and mathematical procedures. This is evidenced by the use of statistical techniques in quality control and inspection; in motion and time study, and in trade and aptitude testing for employees.

Mathematical applications, begun some years ago in the study of economic lot sizes in manufacturing and purchasing, are consolidating their gains and seeking new fields. Many standard procedures are being converted to the form of slide rules and graphic charts.

Decentralization

There is a very definite trend toward the establishment of smaller manufacturing units by decentralization and departmentization. Henry Ford, after 20 years of experimentation, finds that it works. Modern budgetary control makes the management of smaller plants possible in many industries today. The advantages? A return of the old pride in workmanship; an increased morale through better employee understanding not only of the management but also of the relationship of each operation to the finished product; the possibility of part time employment in agriculture; a greater freedom from restraint, etc.

These are the trends in production. They are most forward looking and encouraging; they recognize fully that "you cannot do today's job with yesterday's methods and be in business tomorrow."

Trends In Marketing
Customer Benefits

"One hundred years ago," says Dr. Karl T. Compton, "the average person had about 52 wants, of which 16 were regarded as necessities. Today the wants number 484, on the average, of which 94 are looked upon as necessities."

Able management is beginning to realize the importance of fostering these wants. From "the buyer beware" attitude of the past, the trend is definitely towards a point of view crystallized by the term "*customer benefits.*"

This newer approach is concerned not so much with breaking down *sales resistance* as it is in finding the causes of such resistance and eliminating them. To this end, modern selling begins in the research laboratories, in the engineering departments, and on the factory floors. These centers of ideas and production are the focal points of attack in fashioning "consumer acceptance" for it is the thought of the consumer that seems to be the most important element in marketing today.

Merchandising

In its broad sense, merchandising comprehends the determination of the very nature and character of the merchandise that is to be offered for sale, as well as the manner in which it is to be sold. Mr. Henry G. Weaver, famous for his customer research studies for General Motors, defines merchandising as a matter of:

getting the *right* product
in the *right* place
at the *right* price
in the *right* quantities
at the *right* time
served up to the customer
in the *right* manner.

The interests of intelligent management and the general welfare coincide. Business, organized as it is to make a profit, is becoming increasingly aware that there is demonstrably more profit in the long run in giving people what they want. To that end, consumer wants and product acceptance are the terms in which able management is orienting its thinking for tomorrow.

Market Analysis and Sales Planning

At the New York World's Fair, in the Hall of Man, stands an exhibit which for sheer significance and dramatization is difficult to excel. It deals with population trends. A chart explains that:

Every hour the population of the United States increases 109 persons:

274 are born + 8 who immigrate 282
170 die + 3 who emigrate 173
Giving a net increase of .....109 persons

Below the chart is a lighted exhibit of a hospital and a church. Beside the hospital stands a nurse with a

baby in her arms. Every 13 seconds a light is flashed in the hospital denoting a birth. Besides the church is a grave yard in which stands the Grim Reaper, scythe in hand. Every 21 seconds a light flashes in the church denoting the passing of another soul. In other words, there is:

A Birth Every 13 Seconds
A Death Every 21 Seconds

Increases will continue, statiticians estimate, at a declining rate until 1982, when the population will actuall begin to decrease. Such are the problems of the present and the future.

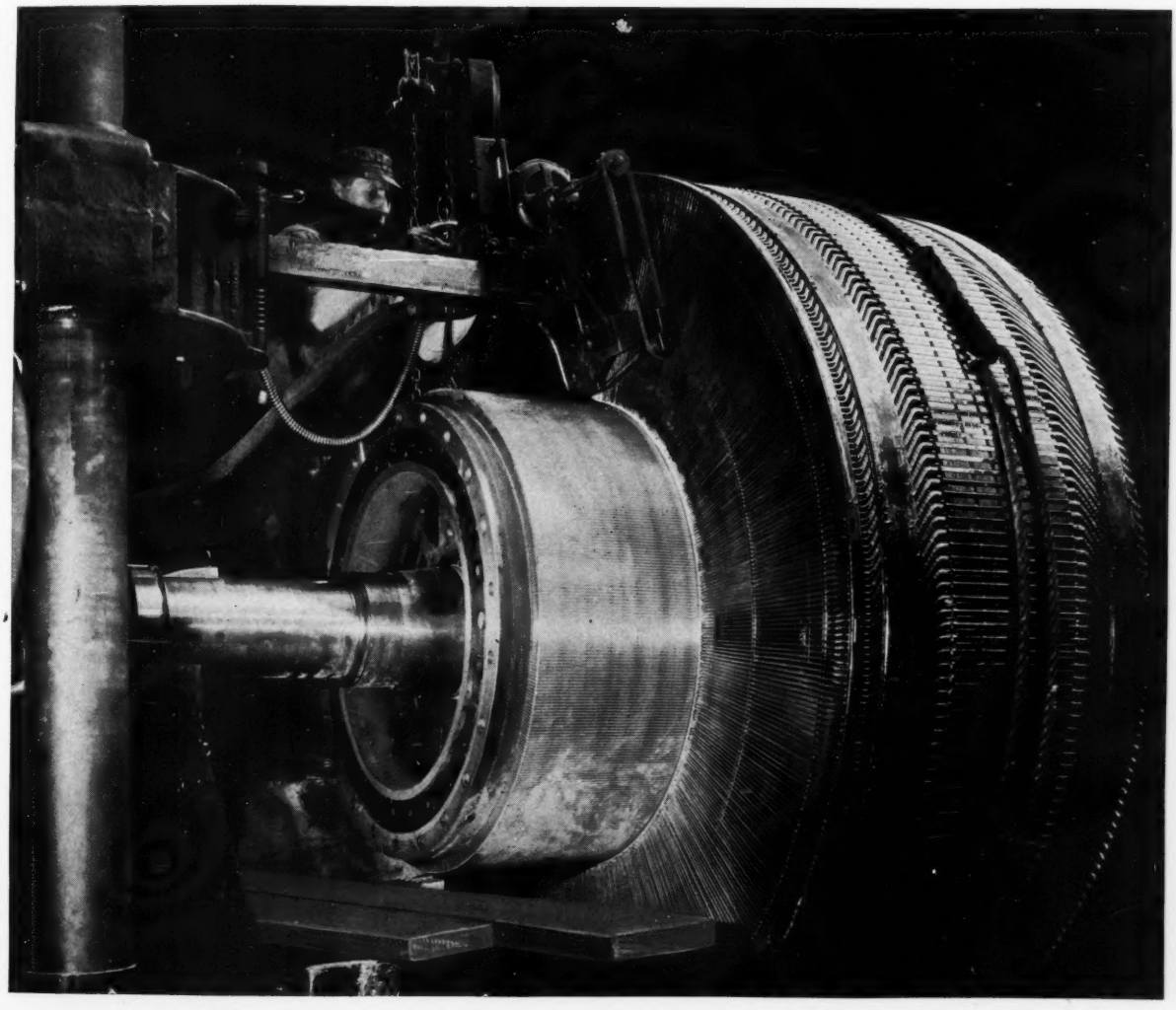
They emphasize for marketing Charles C. Parlin's terse saying, "You are *not* selling a standing army, you selling a parade; part of your market every year is passing out and another part coming in." This parade of potential customers presents a multitude of problems involving research into many fields. Hence, we find studies of consumer attitudes, buying motives, habits, locations, interests, etc. on the increase. There is a trend towards "controlled experiments" and the employment of statistical techniques.

Such techniques are constantly being improved. They have made possible great forward strides in the accuracy with which marketing questions can be answered through consumer and trade surveys.

New psychological approaches are being developed to explain better than ever before why sales patterns take the form they do.

Yet, when everything is said and done, market research as a formalized profession is still in its infancy. The link between market analysis and sales planning is yet to be fully forged. But the rate of gain in ten brief years gives the promise of a bright tomorrow.

(TO BE CONCLUDED)



MODERN PRODUCTION METHODS APPLY TO THE BIG AS WELL AS THE SMALL

The Cornell Engineer

PUBLICATION BOARD

Editor-in-Chief: Beach Barrett, M.E. '40
Managing Editor: R. J. Reeves, C.E. '40
Associate Editor: R. G. Irish, A.E. '40
Personnel Manager: J. C. Marshall, E.E. '40
Business Manager: J. A. Frank, A.E. '40
Advertising Manager: R. R. Graham, C.E. '40
Circulation Manager: A. W. Harrington, E.E '40
Treasurer: J. R. Billings, M.E. '40
Member-at-Large: D. H. Seipt, E.E. '40

JUNIOR BOARDS

Editorial:
R. T. Clark, C.E. '41
R. M. Durbin, M.E. '41
C. C. Eldridge, M.E. '41
S. R. Irish, Jr., M.E. '41
E. B. King, C.E. '41
R. C. Ross, A.E. '41

Business:
S. K. Brown, Jr. E.E. '41
D. M. Bradt, M.E. '41
A. C. Kelterborn, E.E. '41
L. W. Lewis, A.E. '41
N. T. Nelson, M.E. '41
S. F. Nixdorff, Jr., A.E. '41
W. G. Shoemaker, A.E. '41
G. W. Vreeland, Jr., A.E. '41

ADVISORY BOARD

Dean:
Prof. S. C. Hollister

Technical Adviser:
R. F. Howes, A.B. '24

Directors:
Prof. W. A. Lewis, Jr., E.E.
Prof. W. F. Barnard, M.E.
Prof. W. L. Malcolm, C.E.
Prof. F. H. Rhodes. Chem.E.

Faculty:
Prof. M. G .Malti, E.E.
Prof. J. E. Perry, C.E.
Prof. C. I. Millard, E.E. '26
Prof. C. C. Winding, Ch.E.

Alumni:
F. A. Barnes, C.E. '97
E. E. Seelye, C.E. '04
R. E. Clark, M.E. '13

Editorial

AS THE time comes to write a few words of welcome and gilt-edged advice to you members of the entering class, the ink just doesn't seem to flow. We think back over three long years only to realize that anything we may say will merely be a repetition of the advice many others have given you. Some of you will follow this advice, as you always intended to do anyhow, and will receive a sheepskin as a token of the efforts you have expended. Sadly enough, a majority of you with equally good intentions but a little less persistence will fall by the wayside, perhaps to find even greater success in some field to which you are better suited.

We cannot resist the temptation to repeat the words of parents, professors, friends, upperclassmen and a host of others who are only too glad to tell you that you have picked a hard course but that good work will see you through. Very few of you would deny this well worn statement, and the disbelievers are very likely to be among those who carefully change the subject when someone asks them what they got on their first prelim.

But everything is not nearly so black as it may look at first glance. You will soon find that there are a few hours per day not needed for working, sleeping and eating, and that these hours can be very pleasurably spent at any number of worthwhile or useless pastimes. Again we feel that we must reecho the advice of your elders and betters in urging you to spend these rare hours profitably. There are few places where free hours can bring greater rewards and advantages than in a university such as Cornell. There are numerous opportunities to exert whatever talents you are blessed with, or to develop new ones you never dreamed you had, and the recognition and experience you can gain are well worth the effort. Again, many of you will let this little gem of advice go unheeded, and will have nothing more than a very nice set of fading memories to show for many pleasantly wasted hours.

However, it looks as if we are getting pessimistic once more, which is no way to welcome a host of bewildered but well meaning frosh. There is a lot more advice we could give you, such as how to handle a slide rule, a coed, a fraternity lead-pipe squad, a salesman or any other of a hundred and one new things you are up against, but you will have to find all these things out for yourself. Meanwhile, we will retire to a quiet spot to reflect on how the freshmen get younger every year, and to accustom our ears to the cry of "Hey 43!"

News of the College

WELCOME Freshmen! It is through this column that you will have your first glimpse of the happenings "inside" the College of Engineering. You have become foot-weary waiting in the seemingly miles-long registration line outside the Drill Hall. Inside the situation did not seem much better as you went from table to table registering for Math 5a and Physics 11. You may have been to your first few classes before you read this, and it probably seemed rather strange and somewhat frightening. But, you haven't seen what we who have been here longer have seen—the life, and activities within the Engineering School. You may not know that the faculty do many other things beside presiding in the class room or laboratory. You doubtless have no idea of the societies and clubs in the "Engine" School. It is the function of this page to give the news of the College. The activities of the various societies, the movements of the faculty and their doings, and items of general interest, we will attempt to present with a personal touch that is absent from the usual news publication.

For you freshmen who are beginning to have some qualms as to where this all leads, we have a reassuring bit of information fresh from the Engineering College Information Bureau so we can vouch for its authenticity. This concerns the placement of the seniors in last year's graduating class. One hundred and twenty-two of the one hundred and thirty seniors had positions as of September eighteenth. This is about 94% if you men wish to check up with your new slide rules. (We checked ourselves just to make sure). We won't bother with a complete breakdown of the figures here. If anyone is interested, come around to the office on the top floor of Lincoln Hall. However, you future Chem E's will be pleased to note that the placement in that school was 100%.

Incidently, while we are thinking of it, why don't you new men drop up and visit us. We may be a bit busy at times, but we are always glad to receive visitors in our office. Sometime later in the fall we will be running a competition for your class and we will doubtless see many of you then.

How many of you have been to the Fair? And we mean the New York World's Fair. We venture to guess that the combined attendance of alumni, undergraduates, faculty, and the class of '43 would amount to a sizable figure. But the Cornell attendance at the Fair is not what we are interested in here. It is the original Morse telegraph, which in past years has reposed peacefully in the Electrical Engineering Library in Franklin Hall, that we mention now. It has been exhibited at the Fair this past summer in one of the focal booths inside the entrance to the Communications Building where it shares the spotlight with the radio apparatus used by Admiral Byrd at the South Pole. The instrument rests on a specially-built fluted pedestal designed in the Cornell College of Architecture. This instrument received the first telegram ever sent, from Washington, D. C., to Baltimore. This consisted of the now famous words; "What has God wrought."

Doubtless all alumni and undergraduates of the College know of the connection between the telegraph and Cornell, but for the benefit of you freshmen, we will explain briefly: Ezra Cornell, the founder of the University, devised the plan for stringing the telegraph wire on poles after the method of burying it underground had proved unsatisfactory. Mr. Cornell later directed and helped finance the construction of numerous lines and in 1856 was one of the organizers of the Western Union Telegraph Company. It was with

(*Continued on page* 20)

Freshman Surveyors Soon Learn That A Transit Is A Great Aid In Watching the (Scenic) Beauties of the Campus.

NEWS OF THE COLLEGE

(*Continued from page* 19)

the fortune that he amassed in the telegraph business that he was able to found and endow Cornell. Hiram Sibley, the first president of the Western Union and Mr. Cornell, the largest stockholder, worked together to establish the College of Engineering. Mr. Sibley presented this instrument to Cornell. If any of you are further interested in the history of Cornell, (which you should be), we advise and recommend Dr. Andrew D. White's autobiography which may be had at the University Library.

You freshmen will presently be bothered, as we have been bothered since our entrance in this University, with preliminary examinations, familiarly known as "prelims". If you don't work quite hard enough you will also be bothered with final exams. But we have gotten wind of a new kind of final which was given to the students in the Industrial Salesmanship course in the Administrative Engineering department. Instead of writing down answers to questions as in the conventional final, the students actually attempted to sell products to professional purchasing agents and were judged by their success. Mr. R. W. Appelton of the Morse Chain Works, and Mr. George Frank, purchasing agent for the University, parried the efforts of the students for three hours. Each student picked his own product and planned a sales campaign over a period of several weeks. We didn't take the course last term but it sure sounds like a ringer!

As evidence that the faculty spends much time with their work outside of the class room, we mention below the activities of a few members of the faculty during the summer months. In addition to this we venture to guess that some of them shot some excellent golf between June and September.

Professors E. M. Strong and W. W. Cotner, both of the School of Electrical Engineering, attended the annual summer conventoin of the American Institute of Electrical Engineers in San Francisco. A paper on "Fractional-Slot and Dead-Coil Windings" by Professor M. G. Malti and Dr. Fritz Herzog also of the Electrical Engineering faculty was presented at the convention.

Professor True McLean, of the Electrical Engineering faculty was elected chairman of the Ithaca Section of the American Institute of Electrical Engineers for the coming year. Mr. J. P. Wood of the same faculty was elected chairman.

To prove that the E.E. faculty didn't monopolize the activities, Professor F. G. Switzer of the Mechanical Engineering School has been elected to the executive committee of the Mechanics Division of the Socciety for the Promotion of Engineering Education. In July he presided at a session of the Hydraulic Division of the American Society of Mechanical Engineers at the semi-annual meeting in San Francisco. While in the west, Professor Switzer inspected the Bonneville and Grand Coulee Dams. To the newcomers who don't know, we might add that Professor Switzer is a nationally known authority on Hydraulics.

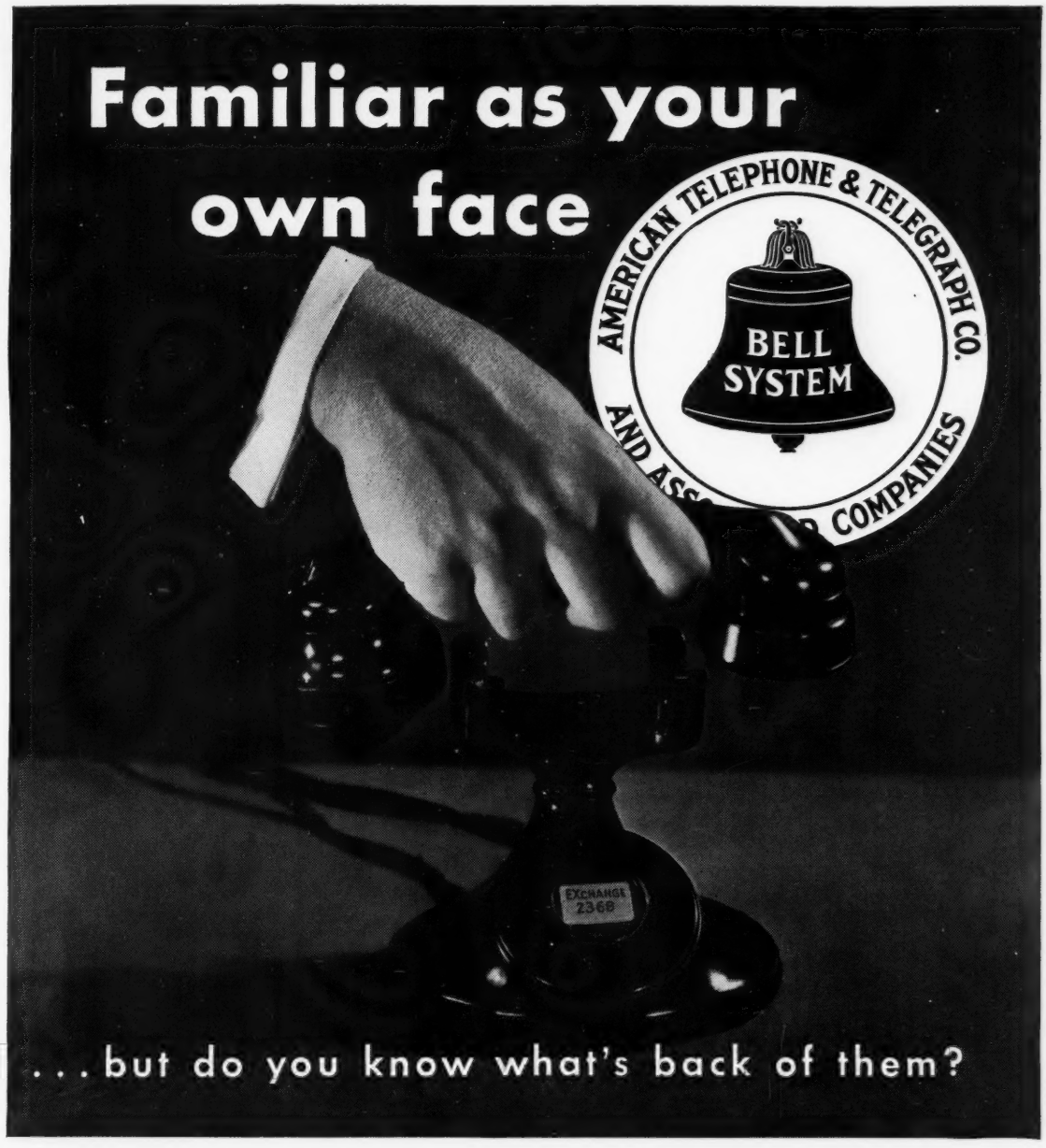
Professor Wm. E. Stanley of the School of Civil Engineering delivered a paper on "A Safety Code for Water Distribution" before the annual convention of the American Water Works Association early in June at Atlantic City.

●

A GRAND man and one who has greatly increased the prestiege of both Cornell and the Electrical Engineering profession, Professor Vladimir Karapetoff of the Electrical Engineering School, retired last June and was made Professor emeritus. Alumni will remember him always, the countless articles and numerous books from his hand vouch for his leadership in the field, and the praise of his associates both in the College and in the profession are proof of his character. You who are entering Cornell this fall have missed one of the "Grand Old Men of Cornell."

Professor Karapetoff joined the faculty in 1904 and became a full professor in 1908. He was born in Petrograd, Russia, in 1876, received the CE degree at the Imperial Institute of Ways and Communication in 1897, and the MME in 1902, having studied meanwhile at the Polytechnic Institute in Darmstadt, Germany. He came to America in 1902, was with Westinghouse and has been consulting engineer to the General Electric Company, and many other firms and utilities. He has been a prolific inventor of electrical devices and musical instruments and is a talented musician, poet, and composer, holding the honorary degree of Doctor of Music from the New York College of Music. Professor Karapetoff's absence from Ithaca at the present time prevents our publishing an interview, but we will try to print one in a future edition.

PROFESSOR KARAPETOFF


Familiar as your own face
AMERICAN TELEPHONE & TELEGRAPH CO.
BELL SYSTEM
COMPANIES
EXCHANGE 2368
. . . but do you know what's back of them?

Here's the set-up back of the familiar blue Bell emblem—

1. American Telephone and Telegraph Company, which coordinates system activities—advises on telephone operation — searches for improved methods.
2. 24 associated operating companies, which provide telephone service in their respective territories.
3. Long Lines Department of A. T. & T., which interconnects the operating companies and handles Long Distance and overseas telephone service.
4. Bell Telephone Laboratories, which carries on scientific research and development for the system.
5. Western Electric, which is the manufacturing and distributing unit of the Bell System.

With common policies and ideals, these Bell System companies all work as one to give you the finest and friendliest telephone service — at lowest cost.

CORNELL SOCIETY *of* ENGINEERS

WILLIS H. CARRIER '01, President
Carrier Corporation, Syracuse, N. Y.

JOHN P. SYME '26, Vice-President
(New York Regional), New York, N. Y.

FURMAN SOUTH, JR., '12, Vice-President
(Pittsburgh Regional), Pittsburgh. Pa.

PAUL A. REYNEAU '13, Secretary-Treasurer
107 East 48th Street, New York, N. Y.

HERBERT H. REYNOLDS '11, Recording Secretary
New York, N. Y.

"The objects of this Society are to promote the welfare of the College of Engineering at Cornell University, its graduates and former students and to establish a closer relationship between the college and the alumni."

President's Column

FELLOW ENGINEERS:

On behalf of our president, Willis H. Carrier '01, who is out of the country on an extended trip, his fellow new administrative officers cordially welcome the entering engineering classes and, through THE CORNELL ENGINEER, convey greetings to our membership throughout the world.

It does not seem to be possible for the far-flung members of this Society to convene in a body, but it is hoped that through this Column you may be brought closer together and kept in touch with the activities of your Society.

It is our hope that each of the more than 15,000 former students of the engineering schools will learn to lean upon this Society to keep him in touch with the activities at the college and to help support it in carrying out its obpectives. New active members are always welcome. The dues are nominal. Write to Mr. George N. Brown, Chairman of the Membership Committee, % Maloney Electric Co., 55 Liberty St., New York City. He will be glad to enroll you as a member and see that you receive copies of THE CORNELL ENGINEER, containing this Column, regularly.

The new Executive Committee, appointed at the last regular meeting of the officers, is composed as follows:

Mr. Walker Cisler, Past President and Alumni Committee Representative
Mr. J. G. Requardt, Past President
Mr. J. D. Tuller, Past President
Professor J. R. Bangs, Chairman of Committee on Regional Secions
Mr. David Harmon, Chairman of Committee on Publications
Mr. George N. Brown and Mr. E. C. M. Stahl, Representatives of the School of Electrical Engineering
Mr. C. Reeve Vanneman and Mr. C. H. Davidson, Representatives of the School of Civil Engineering
Mr. N. G. Reinicker and Mr. B. A. Savage, Rerresentatives of the School of Mechanical Engineering
Director F. H. Rhodes and Mr. B. J. Lemon, Representatives of the Department of Chemical Engineering
Mr. J. H. Lawrence, N. Y. Representatives, Regional Sections Committee

Plans for the winter program of meeting of the New York region have not as yet been completed.

Of interest to every engineering alumnus should be the recognition at Ithaca on October 25th of the late Dr. Robert Henry Thurston. Plans are not yet completed, but tentatively the officers of your Society are planning an informal meeting at Ithaca at that time. The faculty of the College of Engineering is making plans for fittingly observing this day, and I am sure that those who knew Dr. Thurston would find this an appropriate time to make a pilgrimage to Ithaca.

The Regional Sections Committee, under the chairmanship of Professor J. R. Bangs, of Ithaca, N. Y., would be glad to hear from individuals interested in organizing a local unit of the Cornell Society of Engineers. There are a number of cities where Cornell engineers are numerous and active in the business world. The organization of a group with local offices should do much to provide not only pleasant social reunions for many, but the opportunity to exchange points of view and become better acquainted with outstanding Cornell Engineers in the community and at the same time provide the opportunity for unified consideration of problems of the engineering schools at Ithaca. It is the hope of your officers that the coming year will see a growing interest in the organization of regional groups, and I know that the Chairman of the Committee on Regional Sections, backed by the other members of the Executive Committee, will be glad to co-operate and assist in getting any such group effectively organized.

An important function of the Scoiety has been its support of the Placement Bureau under the direction of Mr. Paul A. Reyneau '13. He has conducted this service for some years and makes his headquarters at the Cornell Club of New York, 107 East 48th Street. Cornell engineers seeking positions, or Cornellians seeking either young or experienced engineers, would do well to consult or write Mr. Reyneau, who has done and is continuing to do a great service for Cornell engineers, young and old.

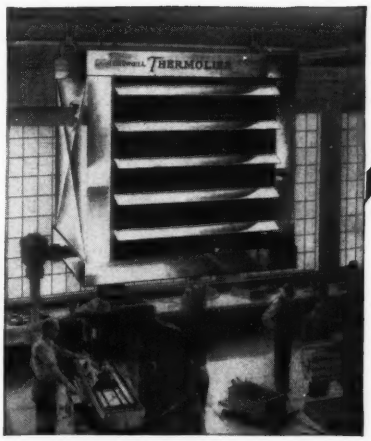
At the time this is being written, fearful news comes to us of the terrible results of war in the other hemisphere. One cannot write a word in a letter such as this without pausing to think of the tremendous and far-reaching effects this catastrophe may have on all of us—wherever in this world we may be. Common sense, tolerance, clear vision and courage are needed by each of us to face the unknown problems that are bound to come. Let us pray that reason, truth and justice will again soon prevail over all people in all lands.

Yours very truly,

JOHN P. SYME
Executive Vice President

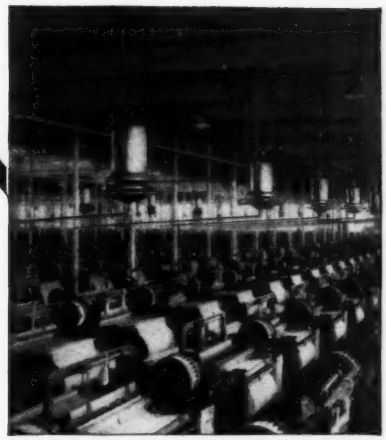
GRINNELL

WHENEVER PIPING IS INVOLVED



HEATING

Grinnell Thermoliers, in three types, thirty sizes, meet every unit heater requirement, supply heat by "special delivery" where and when you want it.



TEXTILE HUMIDIFICATION

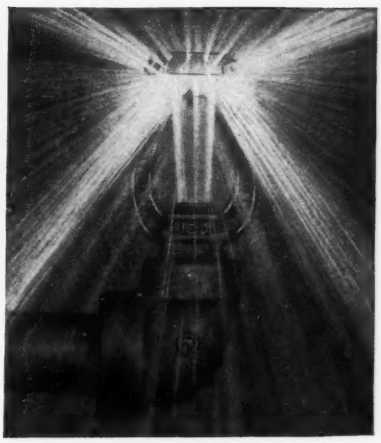
Products and engineering by American Moistening Company, Grinnell subsidiary, surround each textile process with "money-making air" . . . carefully controlled humidification.

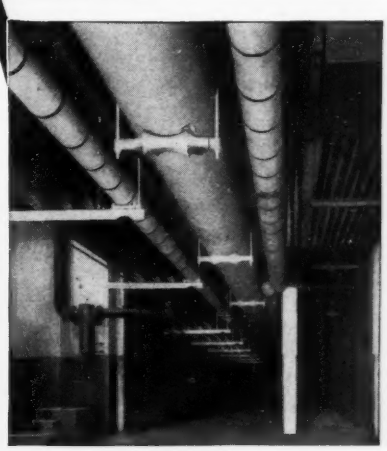
PIPE PREFABRICATION

For all kinds of major power and process piping jobs, Grinnell prefabricates accurate sub-assemblies, easily field-welded into finished piping systems.

FIRE PROTECTION

Guarding over fifty billion dollars' worth of property, Grinnell Automatic Sprinklers stop fire quickly at its source, without human supervision.





PIPING

Grinnell Fittings of Cast Iron, Air Furnace Malleable Iron, Bronze. Welding Fittings, Pipe Hangers and Socket Fittings — all made to famous Grinnell quality standards.

Continent-wide service through branch offices, wholesalers and heating and plumbing contractors. Grinnell Company, Inc., Executive Offices, Providence, R. I. Branch offices in principal cities.

• • •

*Grinnell Company, Inc. * Grinnell Company of the Pacific * Grinnell Company of Canada, Ltd. * American Moistening Company * General Fire Extinguisher Company * Columbia Malleable Castings Corporation The Ontario Malleable Iron Company, Ltd.*

NEWS OF ENGINEERING ALUMNI

NOTED CANADIAN ENGINEER DIES

JUNE 24 marked the passing of one of Canada's foremost engineers, Julian Cleveland Smith, who received his M.E. and E.E. degrees at Cornell in 1900. The story of his leadership in Dominion affairs is the subject of an article in "The Engineering Journal," published in Canada.

"For over a third of a century," says the magazine, "Julian Smith's creative mind had so powerful an influence on the hydro-electric industry of the Dominion that he was everywhere recognized as one of its foremost leaders. Perhaps the broad scope of his engineering knowledge and executive ability is indicated best by the transformation that since the turn of the century has taken place in the St. Maurice Valley in the Province of Quebec. A great flowing river for two hundred and forty miles from its sources in the northern forests into the St. Lawrence, unharnessed in 1900, has, as a result of his foresight, enthusiasm, and courage become the main source of power for one of the notable electric utility systems of the continent. While hundreds of engineers have given of their best in working out the many phases of the basic plan for utilizing the potential two million horsepower of the St. Maurice, Julian Smith was their guiding genius for thirty-five years. The hydraulic engineers who were responsible for the water conservation program; the civil and mechanical engineers who have developed nearly one million horsepower at the falls of Shawinigan Grand'-Mere, La Gabelle, Rapides Blanc, and, presently, La Tuque; the electrical engineers who designed the transmission and distribution network that covers the greater part of central Quebec; the chemical and research engineers who perfected processes that brought to the St. Maurice Valley some of the Dominion's principal industries—all gratefully acknowledge the professional genius of their late chief.

The recognized eminence of Julian Smith in the industrial, the banking, the utility, the transportation, the scientific and the university life of the Dominion is attested by the following partial list of the positions he held: President, The Shawinigan Water & Power Company, Quebec Power Company, St. Maurice Power Corporation, United Securities Limited, and The Canadian Light & Power Company; Vice-President, The Royal Bank of Canada, Dominion Bridge Company, and Dominion Engineering Works; Director; Canadian General Electric Company, Consolidated Paper Company, Montreal Light, Heat and Power Cons., Montreal Island Power Company, Montreal Trust Company and Saguenay Electric Company, and Member of the National Research Council.

"Notwithstanding his many corporate responsibilities, he found time to take a leading part in the work of the engineering societies of Canada, England and the United States. In 1928 he became the 39th president of The Engineering Institute of Canada, and for some time he has been the chairman of the Advisory Committee for Canada of the Institution of Civil Engineers of Great Britain."

•

MME '93, William H. Boehm, after 28 years of service on the Boiler Code Committee of the American Society of Mechanical Engineers, retired on April 28, at which time his colleagues honored him with a dinner.

Boehm was the last remaining active member of the original seven appointed in September, 1911. For his distinguished service to the committee he was made an honorary member for life.

Use The Cornell University Placement Bureau

WILLARD STRAIGHT HALL H. H. WILLIAMS, '25, Director

BERT HOUGHTON DIES

ME '92, Bert Houghton, who retired five years ago as operating engineer of the Brooklyn Edison Company, died on June 17 in Brooklyn, after an illness of several months. He was born in Pittsfield, Mass., attended the district school at Pittsfield and later was graduated from St. Johnsbury Academy. In 1892 he entered Cornell University, and upon graduation worked as draftsman and inspector. From an idea developed after a visit to the Watertown Arsenal, he designed the first motor-operated gun carriage, which he exhibited at the World's Fair in Chicago, 1893. He also designed the electric mail-cancelling machine now used. In 1898 he was engaged by the Boston Electric Company to design and construct the new station. Following that he was employed by the rival Boston Edison Company to rebuild its Atlantic Avenue Station. When the two companies consolidated he was retained in an engineering capacity, and after 15 years with those companies, entered the employ of the Brooklyn Edison Company as assistant operating engineer. In 1920 Mr. Houghton was appointed operating superintendent, holding that position until 1934, when he retired.

LAVA

Manufacturers of
Super-Refractories Only

•

GRAPHITE CRUCIBLES
REFRACTORY CRUCIBLES
HIGH-TEMPERATURE CEMENTS
SPECIAL REFRACTORY
BRICK, TILE, SHAPES

•

From the Following Materials:—
Graphite, Silicon Carbide, Fused Alumina, Mullite, Magnesia, Zircon.

•

LAVA CRUCIBLE COMPANY *of*
PITTSBURGH
PITTSBURGH

PRINTING

Is the art of transferring letters, characters, or designs to paper or other suitable surfaces through the medium of ink or greasy pigments.

To properly execute this process modern equipment is necessary to obtain best results. Our facilities are up-to-date and housed in our own building conveniently located on South Tioga Street about three hundred feet from Ithaca's busiest corner. All your printing needs can best be satisfied here.

Telephone 2271

Stover Printing Co.
113-115 South Tioga Street

Right and On Time Since 1909

FUNDAMENTALS OF HUMAN ENGINEERING

(*Continued from page* 11)

irrational exasperation with technical change in any form, and ultimately to the formation of a type of employee organization such as we have described—a system of practices and beliefs in opposition to the technical organization."

If you think this is only a Harvard professor's theory and that it has nothing to do with practical everyday shop experiences, check with what Spencer Miller of the A.F. of L., one of the best students of today's labor problems, said:

"One feature of motion and time study as it is usually conducted is regarded as unsound by organized labor and socially minded persons outside the labor movement, including some industrial engineers of my acquaintance. This objection is directed more toward the manner in which time study is usually used than against time study itself. In a large number of cases, no provision has been made for encouraging the worker to think about his own job and suggest ways in which it might be improved. This function has been transferred to a time study observer or a planning office, the function of the worker being dehumanized to a mere following of instruction as they come from either of these sources. Unions believe that this implication in the customary use of time study is unsound, and that the worker, who is a human being, should be given every opportunity to bring all his faculties to bear upon his work and, to the limit of his intelligence and skill, participate in developing his own job."

That is why I believe that motion study cannot be successfully installed by having a technician work out a theoretical "one best way," and force this on all workers. If so forced by the operation of wage incentives or by other means, production will be increased, but a point may be reached where the reaction to such coercion will assert itself with almost primitive force. Output gained by these methods is obtained at a high cost of human energy and satisfaction. The substitution of compulsion for cooperation may threaten the security of the whole industrial system.

May I offer one more suggestion? Keep in mind Charles F. Kettering's famous definition of research: "Research is merely finding out what you are going to do when you can no longer do what you are doing now." Too many companies have failed because they have ignored this simple precept. Too many individuals have likewise fallen short of success because it did not seem important to them. Remember the world is changing. Remember that progress means change. In our fear and lack of confidence engendered by the depression, business and industry have marked time for ten years. When we get over this fear and go back to work things are going to hum. They are going to change rapidly. They are going to change more rapidly than the older executives and industrialists can possibly comprehend. Be ready for this change. Not only be ready for the change, but anticipate it and be prepared to sell it in spite of all the closed minds. Don't be afraid to ask "Why?"

An outstanding business executive who is a close friend of mine once said to me, "Mogy, if I find something being done in my business the same way that it was done months ago, I think it is probably wrong. If I find it being done the same way that it was done a year ago, I know damn well it is wrong." I hope you find a fellow like that to work for. I hope you will have fun at your job. If, after giving yourself time enough to really become acquainted, you aren't having fun, quit and get another job.

May I suggest two books as required reading? One is Dale Carnegie's book "How to Win Friends and Influence People." Don't laugh! I am serious. Recently in discussing this book with Dale Carnegie I told him I could not understand why it was that millions of people had read his book, but apparently there was not much change in human nature. I told him that they still shoved me around in the New York subways and stepped on my feet the way they always did. I found no one who stood back and said, "Won't you go first, Sir?" Mr. Carnegie said this: "There is not one single thing in that book that is natural. We all agree that they are the things to do, but if you study them you will find that every one requires a good deal of effort because we do not do them as a matter of course." That is why every delegate to the Work Simplification Conference at Lake Placid receives a copy of this book and is asked to read it. This precedes his course in "Influencing Men in Business."

The second book is Arnold Bennett's "How to Live on 24 Hours a Day." They never gave us anything on this at Cornell. Nevertheless, you have a couple of months to study it and make use of the priceless principles outlined by Bennett before you start on your first job.

THE FEWER, THE BETTER

The demand of the times for more production per dollar, without sacrifice in quality, brings into sharper and sharper focus the necessity for the use of the most modern materials. It is natural that the more different steels specified in machine construction, the greater the fabrication and stock room complications.

To reduce these complications, many manufacturers are taking advantage of the versatility of Molybdenum Steels. One, a builder of a varied line of heavy duty machines, replaced four different alloy steels with Chromium-Molybdenum Steel (SAE 4140) for everything from heavy crank shafts to small screw machine parts.

We will gladly send our booklet, "Molybdenum in Steel", containing a great deal of practical data, free on request from technical students and all others interested in modern improved materials giving more per alloy dollar.

PRODUCERS OF MOLYBDENUM BRIQUETTES, FERRO-MOLYBDENUM, AND CALCIUM MOLYBDATE

Climax Mo-lyb-den-um Company
500 Fifth Avenue · New York City

MOLY

This strong, durable steel tape is unquestionably the finest light weight steel tape made. Line is only ¼" wide. Either the 25' or the 50' tape fits conveniently in your vest pocket, is handsomely finished in genuine, selected brown leather. It is so attractive and yet so practical that it is often purchased for fine gift purposes. See it at your dealers. Write for Catalog 12A.

NEW YORK 106 Lafayette St. — THE LUFKIN RULE CO. SAGINAW, MICHIGAN — Canadian Factory WINDSOR, ONT.

TAPES — RULES — PRECISION TOOLS

There are only three kinds of Investments which you can make

1. Investments Which Remain Stable.
2. Investments Which Decline In Value.
3. Investments Which Advance In Value.

•

Life Insurance is one of the Outstanding Investments which, as the years pass by, Advances in Value

During the past 39 years over 1000 thrifty students graduating from the Engineering Department of Cornell University have created life insurance and annuity policies from the

NEW YORK LIFE INSURANCE CO.

For further information regarding a guaranteed life income beginning at age of 60 or 65,

Consult the Local Representatives,

CHARLES H. WEBSTER
ROBERT L. WEBSTER
EDWIN R. WEBSTER

100 White Park Place
Phone 9278

CAMPUS FAVORITES

Choose Jewelry from Heggies

Whether the need be a fine watch—Hamilton, Gruen, Girard-Perregeux Longines or a lower priced one—studs, buttons, chains, or a gift for the girl friend, our stock is replete with lovely things–Cornell jewelry featured.

▼ ▼ ▼

Fine watch, clock
and jewelry repairing

▼ ▼ ▼

R. A. Heggie & Bro. Co.

Jewelers

Phone 2277 — 136 E. State St.

THRIFT SERVICE

3 Shirts
1 Underwear (2 pc.)
1 Pair Pajamas
10 Miscellaneous Pieces of Towels
Socks
Handkerchifs

95c

Dry Cleaning and Pressing

STVDENT LAVNDRY AGENCY, INC.

LEE SCHOENBRUNN '40, *Pres.*
REX WOOD '41, *Vice-Pres.*

409 College Ave. — Dial 2406

Johnny's Coffee Shoppe

A good place to eat anytime
and all the time

Steaks and Chops our specialty

202 Dryden Road
JUST OFF COLLEGE AVENUE

AIR CONDITIONED

OPEN AT ALL HOURS

CLASS OF '43!

IT'S HARRY GORDON'S
Service Stations "All Over Town"

ON THE HILL:

1. Ithaca & Dryden Rds.
   Phone 2611
2. Dryden Rd. Service Station
   Phone 2606

DOWN TOWN:

3. Fulton & West Buffalo
   Phone 2008
4. Cayuga & Marshall
   Phone 5763

All* ATLANTIC *Products

Just to
Remind
You . . .

HERE'S
OUR CARD!

G-E Campus News

ENTERTAINING ROYALTY—BY PROXY

WHEN Great Britain's King and Queen visited the New York World's Fair on their international social call, 20 farmers were able to watch the royal pair as closely as if they were entertaining Their Majesties out on the farm. And the rural folk were 130 miles away from the Fair grounds.

This long-distance watching was made possible by G-E television engineers. Directed by C. A. Priest, Maine '25 and ex-Test man, radio engineer for General Electric, they were simply proving that television programs could sometimes be received at a far greater distance than the previously supposed limit of 40 to 50 miles.

For, instantly and clearly, while the King and Queen inspected the Fair, television reproduced complete details of their visit to the group 130 miles away, atop the Helderberg Hills near Schenectady. Not far from the scene of this experiment is General Electric's powerful new television station, W2XB, soon to go on the air.

TECHNICAL DOUBLE TALK

WALKING through one of General Electric's factory buildings, a visitor paused in front of two young men kneeling in front of an electric motor. He was mystified to hear, "Say, Bill, put a tac on that BTA, and after you've hooked up the pots and c-t's and plugged power, see if she still swings and hunts!"

All of which made as much sense to the visitor as "gate," "jive," "alligator," and similar swing-music terms mean to a symphony conductor. Translated, the young man was merely asking his co-worker to connect certain instruments to the motor, turn on the power, and notice whether the motor ran smoothly.

Few of the graduate engineers selected by General Electric for its Test Course are familiar with this Test man's jargon when they arrive. But after a few days in the shops the new man, too, is rattling away in the technical double talk as expertly as his elders.

TRAVELING HOTEL

NEXT Spring, when a hotel-on-wheels rolls into Bombay, India, some of the citizenry may have grave doubts about their sanity. Or they may blame the blazing tropical sun. They'll be wrong. Lawrence Thaw's trans-Asiatic motorcade will be completing a 14,000-mile safari from Paris.

Quite obviously, such things as 14,000-mile trips require quite a bit more than *savoir-faire* and an adventuresome spirit. Preparation, and plenty of it, was required by Mr. Thaw. This brought into the picture—both directly and indirectly—G-E engineers.

The four mobile units of the motorcade boast of the latest G-E two-way radio, for maintaining contact between the various vehicles throughout the journey. During tests two of the units maintained contact when as far as 200 miles apart. Air conditioned throughout, the deluxe trailer contains all the appliances and equipment normally found in a modern home—from tiled bath and indirect lighting to an array of electric appliances.

GENERAL ELECTRIC

20-181C